A National Study on the Prevalence and Factors Associated with Smoking Amongst Malaysians Aged 18 Years and Above

[1]Lekhraj Rampal, [2]Sanjay Rampal, [1]MZ Azhar,
[1]MS Sherina, [3]T Mohamad, [4]R Ramlee & [5]J Ahmad

[1] Faculty of Medicine and Health Sciences, Universiti Putra Malaysia
43400 UPM Serdang, Selangor, Malaysia
[2] Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia
[3] Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak
[4] Ministry of Health Malaysia
[5] Department of Statistics Malaysia

ABSTRACT

Objective: A cross-sectional study was conducted in Malaysia with the objectives of determining the prevalence of smoking in Malaysia, reasons for starting to smoke, age first started to smoke, duration of smoking and to determine the relationship between smoking and age, sex, race, education level, peer influence and parental smoking status. **Methods:** All residents aged 18 years and above from selected households were included in this study. A standardised pre-tested structured questionnaire was used in this study. **Results:** The results showed that the overall mean age of the 17, 246 respondents was 38.8 (95% CI= 38.5 – 39.2) years with a range of 18 – 100 years. The majority were Malays (55.5%) followed by Chinese (21.2%) and Indians (11.2%). The age, sex and ethnicity adjusted prevalence of ever and current smokers were 32.0% and 24.9% respectively. The prevalence of ever and current smokers for males was 59.3% and 47.2% respectively. For the females, the prevalence of ever and current smokers was 4.8% and 2.7% respectively. The highest ethnicity adjusted prevalence of current smokers was in Malays (28.9%), followed by the Chinese (18.7%). The lowest prevalence was amongst the Indians (16.8%). The highest prevalence of current smokers was found in Kelantan (30.2%), Terengganu (29.7%), Pahang (28.7%) and Kedah (26.9%); the lowest prevalence was in Kuala Lumpur, Federal Teritory (20.4%). The overall mean initiation age of current smokers was 19.2 years (95% CI = 19.1, 19.4 years). The mean initiation age of male current smokers was significantly lower (18.9 years) compared to female current smokers (24.1 years). The mean duration of smoking amongst the current smokers was 18.6 years. Males smoked significantly more cigarettes than the females ($p < 0.001$). **Discussion:** Multivariate logistic regression analysis showed that smoking was significantly associated with age, sex, ethnicity, educational level and peer and family influence.

Keywords: Smoking, prevalence, initiation age, peer influence, Malaysia

INTRODUCTION

Smoking is the most preventable cause of death. It causes three million deaths each year worldwide.[1] One in ten adults worldwide are killed by tobacco and by 2030 the proportion

*Corresponding author: *dr_rampal1@hotmail.com*

will be one in six, or 10 million deaths per year. Until recently, this epidemic of chronic disease and premature deaths mainly affected the rich countries. It is now rapidly shifting to the developing world. By 2020, 7 of every 10 people killed by smoking will be in low-and middle-income nations. By 2025, the number of smokers worldwide is expected to rise to more than 1.6 billion.

In the high-income countries, smoking has been showing an overall decline for decades although it continues to rise in some groups. In low and middle-income countries, by contrast, cigarette consumption has been increasing. Most smokers start young. In the high-income countries, about 8 out of 10 begin in their teens. While most smokers in low-and middle-income countries start in the early twenties, the peak age of uptake in these countries is falling. In most countries today, the poor are more likely to smoke than the rich.[2] The consumption of cigarettes in the developed countries is reducing. For example the prevalence of smoking has dropped among the males in the United Kingdom by 20%, in Norway by 11%, in Australia by 40% and in Canada by 9%.[3]

The Surgeon General's 2004 'Report on the Health Consequences of Smoking' concludes that the evidence is sufficient to infer a causal relationship between smoking and cancers of the lungs, oral cavity, larynx, esophagus, stomach, bladder, renal pelvis, pancreas and cervix. It also concluded that the evidence is sufficient to infer a causal relationship between smoking and cardiovascular diseases such as coronary heart disease, stroke, sub-clinical atherosclerosis and abdominal aortic aneurysm. Other conclusions were that the evidence is sufficient to infer a causal relationship between active smoking and chronic obstructive pulmonary disease and mortality. The report also stated that the evidence is sufficient to infer a causal relationship between smoking and reduced fertility in women; between sudden infant death syndrome and maternal smoking during and after pregnancy and a causal relationship between maternal active smoking and premature rupture of the membranes, placenta previa and placenta abruption.[4]

In the USA, smoking during pregnancy remains a major public health problem despite increased knowledge of the adverse health effects of smoking during pregnancy. Although the prevalence of smoking during pregnancy has declined steadily in recent years, a substantial number of pregnant women continue to smoke and only about one-third of women who stop smoking during pregnancy still abstain a year after the delivery.[5] Environmental exposure to tobacco smoke is a serious environmental hazard and one that is easily avoided. It causes an increase in the risk of lung cancer and ischaemic heart disease.[6,7,8] In Malaysia, the prevalence of smoking in 1996 among males was 49.2% and 3.5% in females.[9] The objectives of this study were to determine the prevalence of smoking in Malaysia, reasons why they started smoking, age first started smoking, duration of smoking and the relationship between smoking and age, sex, ethnicity, education level, peer and parental smoking status.

METHODS

This cross-sectional study was carried out in 2004 and covered the whole of Malaysia including the states of Sabah and Sarawak. The Ethical Committees of the Ministry of Health Malaysia and the Faculty of Medicine and Health Science, Universiti Putra Malaysia approved the study.

The sampling was carried out by the Malaysian Statistics Department. The survey frame was based on the information gathered from the census Year 2000. Malaysia was divided into artificially created, contiguous geographical areas called Enumeration Blocks (EBs). An EB consists of 80-120 living quarters and has specified boundaries (either natural or artificial), which do not straddle administrative boundaries. Each of the states and the Federal Territory Kuala Lumpur constitute a primary stratum. A stratified two-stage cluster sampling design with proportional allocation was used for this study. The first stage units of the random sample selection were the EBs while the second stage units were living quarters (LQs) within the selected EB. Selection of sample within the enumeration blocks was based on the number of Living Quarters (LQs) in the stratum. About eight LQs were selected from a sampled EB, the actual number was determined by the size of the EB based on the latest listing exercise carried out by the Statistics Department Malaysia.

The public health officer informed the head of the selected household of the study's objective, date and approximate time of interview. Visits to the living quarters were then made by the interviewer at the appointed date. All respondents eighteen years and above, upon receiving verbal consent were interviewed. A structured pre-tested questionnaire produced in three languages (English, Malay and Chinese) was used to collect the data. The questionnaire included questions on smoking status, age first started smoking, and reasons for starting, duration of smoking and smoking status of their friends and family members.

In this study, an ever smoker is defined as a person who reported smoking before in his/her entire life. A current smoker is defined as someone who presently smokes daily and has smoked within the last 30 days. Duration of smoking was computed in years. Age was computed from the information on date of birth and date of interview. The highest education level attained was grouped into: no formal education (0 years), primary education (1-6 years), secondary education (7-13 years) and university or college education (> 13 years of education).

This study was designed to provide precise estimates of the prevalence of smoking in Malaysia. All data was analysed using Stata 9.2 software and took into account the complex survey design employed. The design weight was calculated based on the sampling design. Post-stratification adjustment of the weights was performed and took into account non-response, sex, ethnicity and age distribution differences between the sample and the total population. Continuous variables were presented as means with their standard errors (SE). Categorical variables were presented as percentages with percent standard error. The relationship between smoking and age, sex, race, education level, peer and parental smoking status was investigated using multiple logistic regression. A two-sided p-value of < 0.05 was considered as statistically significant.

RESULTS

Table 1 shows the characteristics of respondents by age, sex and ethnicity. Of the 17,246 respondents aged eighteen years and above interviewed, 7,382 (43%) were males and 9,864 (57%) were females. The weighted mean age of the respondents was 38.8 (95% CI= 38.5 – 39.2) years with a standard error of 0.2 years. The weighted median age was 37 years and

Table 1. Characteristics of respondents (n=17,246)

Sex/Age (Years)	Malay	Chinese	Indian	Bumiputra Sarawak & Sabah	Others	Total
Male						
18 – 19.99	263	65	47	49	8	432
20 – 29.99	789	253	152	213	34	1441
30 – 39.99	786	296	149	223	24	1478
40 – 49.99	820	332	164	188	18	1522
50 – 59.99	699	287	108	96	10	1200
60 and above	737	350	106	106	10	1309
Total	4094	1583	726	875	104	7382
Female						
18 – 19.99	344	80	74	54	6	558
20 – 29.99	1120	302	262	264	21	1969
30 – 39.99	1173	452	226	256	33	2140
40 – 49.99	1180	448	268	213	21	2130
50 – 59.99	921	379	199	122	19	1640
60 and above	744	406	152	108	17	1427
Total	5482	2067	1181	1017	117	9864
Both Sexes						
18 – 19.99	607	145	121	103	14	990
20 – 29.99	1909	555	414	477	55	3410
30 – 39.99	1959	748	375	479	57	3618
40 – 49.99	2000	780	432	401	39	3652
50 – 59.99	1620	666	307	218	29	2840
60 and above	1481	756	258	214	27	2736
Total	9576	3650	1907	1892	221	17246

ranged from 18 to 100 years. The difference between the mean age of males (38.8 yrs) as compared to females (38.9 yrs) was statistically non-significant (p=0.549). The majority of the respondents were Malays (55.5%) followed by Chinese (21.2%) and Indians (11.1%). Following adjustment, the racial proportions were as follows, Malays (52.3%), Chinese (27.9%) and Indians (8.1%).

Table 2 shows the prevalence of ever and current smokers in Malaysians by age and sex. Out of the 17,246 respondents, the age, sex and ethnic adjusted prevalence of ever and current smokers were 32.0% and 24.9% respectively. Of the 5186 ever smokers, 4,685 (90.3%) were males and only 501 (9.7%) were females. The prevalence of ever and current smokers for males was 59.3% and 47.2% correspondingly. For the females, the prevalence of ever and current smokers was 4.8% and 2.7% respectively. The results show that the prevalence of ever smokers in males is high in all the age groups and ranges from 46.9% to 63.1%. It should be noted that there is a significant proportion of males (46.9%) aged 18 to 19 years who are ever smokers. Amongst the females, the prevalence of ever smokers is below 5% except in those aged 60 years and above (12.1%). There was a significant association between ever smoker and sex (p<0.001) and current smoker and sex (p<0.001).

Table 2. Prevalence of ever and current smokers among Malaysians by age and sex (n=17,246)

Sex/Age (Years)	Ever Smoker Prevalence% (SE %)	Current Smoker Prevalence% (SE %)
Male		
18 – 19	46.9 (2.9)	40.5 (3.0)
20 – 29	58.7 (1.5)	52.5 (1.5)
30 – 39	63.1 (1.5)	52.4 (1.5)
40 – 49	58.9 (1.5)	46.9 (1.4)
50 – 59	57.8 (1.6)	39.1 (1.5)
≥ 60	63.0 (1.6)	36.8 (1.5)
Total	59.3 (0.7)	47.2 (0.7)
Female		
18 – 19	2.3 (0.6)	0.9 (0.4)
20 – 29	4.0 (0.5)	1.3 (0.3)
30 – 39	3.9 (0.5)	2.6 (0.4)
40 – 49	3.4 (0.4)	2.4 (0.4)
50 – 59	4.4 (0.5)	3.1 (0.5)
≥ 60	12.1 (0.9)	6.7 (0.7)
Total	4.8 (0.3)	2.7 (0.2)
Both sexes		
18 – 19	24.7 (1.9)	20.8 (1.8)
20 – 29	31.5 (1.0)	27.0 (0.9)
30 – 39	33.3 (0.9)	27.3 (0.8)
40 – 49	31.4 (0.9)	24.8 (0.8)
50 – 59	31.7 (1.0)	21.6 (0.9)
≥ 60	36.4 (1.0)	21.1 (0.9)
Total	32.0 (0.5)	24.9 (0.4)

Table 3 shows the prevalence of ever and current smokers by sex and ethnicity for respondents aged eighteen years and above. The overall prevalence of ever smokers was highest in Malays (37.0%) followed by Chinese (25.3%), and Indians (21.1%). It was also high in Bumiputra Sarawak (35.8%) and Bumiputra Sabah (32.0%). There was a significant difference of ever smokers between Malays and Chinese ($p<0.001$), Malays and Indians ($p<0.001$), and Chinese and Indians ($p=0.01$). For current smokers, the highest prevalence was also among Malays (28.9%), Bumiputra Sarawak (27.9%), Bumiputra Sabah (26.8%) followed by the Chinese (18.7%) and Indians (16.8%). Amongst the males, prevalence of ever smokers was highest among the Malays (69.8%), Bumiputra Sarawak (61.2%) and Bumiputra Sabah (57.5%), as compared to the Chinese (45.2%) and Indians (41.4%). As for females, it was highest amongst the Bumiputra Sarawak (10.7%) and Bumiputra Sabah (5.5%) followed by the Chinese (5.0%), Malays (4.6%) and the Indians (1.1%).

Table 4 shows that the overall prevalence of current smokers was lower amongst those with no formal education and those with a college or university educational level compared with those with primary or secondary education. This association is modified by sex whereby among females, those with no formal education have the highest prevalence.

Table 3. Prevalence of ever and current smokers by sex and ethnicity (n=17,246)

Ethnicity	Sex	Ever Smokers % (SE %)	Current Smokers % (SE %)
Malay	Male	69.8 (0.8)	55.6 (0.9)
	Female	4.6 (0.3)	2.6 (0.2)
	Total	37.0 (0.6)	28.9 (0.6)
Chinese	Male	45.2 (1.6)	34.1 (1.5)
	Female	5.0 (0.6)	3.0 (0.4)
	Total	25.3 (1.0)	18.7 (0.9)
Indian	Male	41.4 (2.2)	33.4 (2.1)
	Female	1.1 (0.3)	0.5 (0.2)
	Total	21.1 (1.3)	16.8 (1.2)
Others	Male	55.4 (10.4)	46.1 (9.4)
	Female	5.1 (2.0)	3.5 (1.6)
	Total	27.5 (4.7)	22.5 (4.4)
Bumiputra Sarawak	Male	61.2 (3.6)	50.9 (3.2)
	Female	10.7 (1.9)	5.2 (1.4)
	Total	35.8 (2.3)	27.9 (2.0)
Bumiputra Sabah	Male	57.5 (2.4)	50.2 (2.2)
	Female	5.5 (1.0)	2.6 (0.6)
	Total	32.0 (1.6)	26.8 (1.6)

Table 4. Prevalence of current smokers by educational level (n=17,246)

Education Level	% Prevalence (SE%)		
	Male	Female	Both sexes
No Formal Education	49.9 (2.8)	8.7 (0.9)	18. 7 (1.1)
Primary	48.2 (1.3)	2.2 (0.3)	24. 8 (0.8)
Secondary/ Skill Course	51.4 (1.0)	2.0 (0.2)	27.4 (0.6)
College/University	31.9 (1.7)	1.0 (0.3)	19.0 (1.1)

However, the prevalence of current smoking among males and females with college or university education is consistently lower.

Table 5 shows the prevalence of ever smokers by state and sex. The results show that the highest prevalence of current smokers was found in Kelantan (30.2%), Terengganu (29.7%), Pahang (28.7%), Kedah (26.9%), Johor (26.3) and Negeri Sembilan (25.9%), while the lowest prevalence was in Wilayah Persekutuan Kuala Lumpur (20.4%) and Perak (21.4%).

Table 6 shows the reasons why current smokers started smoking, age started smoking and duration of smoking. The results show that the majority (83.1%) of the current smokers started smoking because either their friends asked them to try or were trying it for fun. More

Table 5. Prevalence of current smokers by state and sex (n=17,246)

State	Prevalence % (SE%)		
	Male	Female	Both sexes
Kedah	54.0 (2.6)	1.8 (0.6)	26.9 (1.3)
Penang	44.1 (2.5)	1.7 (0.5)	22.6(1.5)
Perak	41.9 (2.4)	2.6 (0.5)	21.4 (1.4)
Selangor	43.1 (2.1)	2.4 (0.5)	23.4 (1.2)
Negeri Sembilan	50.0 (4.0)	2.8 (1.0)	25.9 (2.1)
Melaka	47.8 (3.6)	3.0 (1.7)	24.6 (2.2)
Johor	51.5 (1.8)	1.2 (0.3)	26.3 (1.2)
Kelantan	56.3 (3.0)	5.4 (1.0)	30.2 (1.8)
Terengganu	58.1 (3.2)	1.9 (0.7)	29.7(2.0)
Pahang	54.0 (3.0)	2.9 (0.8)	28.7 (1.8)
WPKL	36.2 (2.6)	3.2 (0.8)	20.4 (1.5)
Sabah	46.7 (2.1)	2.9 (0.6)	25.2 (1.4)
Sarawak	45.2 (2.4)	4.2 (0.9)	24.6 (1.5)
Total	47.2 (0.7)	2.7 (0.2)	24.9 (0.4)

than 85% of current smokers started smoking before the age of twenty-five years old. The overall mean initiation age of current smokers was 19.2 years (95% CI = 19.1, 19.4 years). The difference between the mean initiation ages for the males of 18.9 years compared to 24.1 years for the females was statistically significant (p=<0.001). The results also show that the mean duration of smoking amongst the current-smokers was 18.6 (SE = 0.3) years. The majority (69%) of the current smokers had smoked for 10 years or more. Of the current smokers, 39.2% had smoked for 20 years or more. The mean duration of smoking amongst current smokers was significantly lower in males (18.3 years) compared with 23.3 years in females (p <0.001).

Further analysis show that once they started to smoke, overall only 22.3% were able to quit. The quit ratio for the females was 42.6% compared with 20.6% for the males. The highest quit rate was amongst the ever smokers who had no formal education (31.1%) followed by those with primary education (28.1%), and those with tertiary education (24.6%). Respondents with secondary/certificate skill (18.2%) had the lowest quit rate.

Table 7 shows the results of logistic regression results showing crude and adjusted associations between current smoking status and age, sex, ethnicity, highest education level attained, friends and family members smoking status and self-esteem. The results show that current smoking is associated with age, sex, ethnicity, educational level, friends and family members smoking status. Malays had approximately two times higher odds of being a current smoker compared with Chinese (aOR 1.83; 95%CI 1.58 - 2.1). The Indians have 0.83 times the odds of being a current smoker compared to a Chinese (95%CI=0.66, 1.05). Compared with females, males have 27.21 (95%CI=22.72, 32.59) times higher odds of being an ever smoker. Comparing those who had a college /university education, the odds of being a current smoker was significantly higher in those with no formal education (aOR 6.61; 95%CI 4.91 – 8.89), with primary education (aOR 2.68; 95%CI 2.18-3.30) and with

Table 6. Characteristics of current smokers by sex

Characteristics	Weighted % (SE%)		
	Male (N=3598)	Female (N=285)	Both Sexes (N=3883)
Reasons why started smoking			
Friend asked me to try	49.8 (1.0)	25.0 (3.0)	48.5 (1.0)
To try for fun	33.7 (1.0)	49.8 (3.1)	34.6 (0.9)
To release tension	7.1 (0.5)	9.3 (1.9)	7.2 (0.5)
Think it is stylish, for fun	3.7 (0.4)	1.7 (0.8)	3.6 (0.3)
My parents smoke so I smoke too	1.4 (0.2)	5.8 (1.5)	1.6 (0.2)
Others	4.1 (0.5)	6.7 (1.7)	4.2 (0.5)
No response	0.3 (0.1)	1.7 (0.8)	0.4 (0.1)
Age started smoking			
< 10	0.5 (0.1)	0.5 (0.4)	0.5 (0.1)
10 – 14	13.1 (0.6)	8.3 (1.8)	12.8 (0.6)
15 – 19	48.5 (1.0)	30.0 (3.1)	47.5(0.9)
20 – 24	26.0 (0.8)	21.3 (2.9)	25.8 (0.8)
25 – 29	7.1 (0.5)	14.9 (2.4)	7.5 (0.5)
≥30	4.9 (0.4)	24.9 (2.7)	5.9 (0.4)
Duration of Smoking			
< 2 Years	3.3 (0.5)	6.7 (1.8)	3.4 (0.4)
2 - 4	9.1 (0.6)	10.1 (2.0)	9.1 (0.6)
5 - 9	18.9 (0.8)	9.5 (2.1)	18.4 (0.8)
10 - 14	16.0 (0.7)	12.0 (2.3)	15.8 (0.7)
15 - 19	13.5 (0.7)	8.3 (1.9)	13.3 (0.6)
20 - 24	11.4 (0.6)	12.3 (2.3)	11.5 (0.6)
25 - 29	8.0 (0.5)	8.3 (1.8)	8.0 (0.5)
≥30 Years	19.9 (0.7)	32.7 (2.8)	20.5 (0.7)

secondary education (aOR 2.22; 95%CI 1.87-2.64). Respondents who had friends who smoked had 4.9 times higher odds of being a current smoker compared with those whose friends were non-smokers. Having family members who smoke does increase the odds of a respondent being a current smoker (aOR 2.20; 95%CI 1.97-2.47) compared with those with family members who are non-smokers.

DISCUSSION

This study shows that the overall sex and ethnic adjusted prevalence of current smokers among all Malaysians adult males aged 18 years was 47.2%, which is lower than that reported in 1996 (49.2%).[9] The prevalence of current smokers amongst females is lower (2.7%) as compared to 3.5 % in 1996.[9] This decrease in prevalence shown in 2004 is an important finding. It indicates that the prevalence of smoking in Malaysia is already showing a decline. The 'Tak Nak' campaign launched in 2004 should further decrease the prevalence

Table 7. Logistic regression results showing crude and adjusted relationship between current smoking status and age, sex, ethnicity, highest education level attained, friends and family members smoking status

Risk factors	Crude Odds Ratio	*p* value	Adjusted Odds Ratio	*p* value
Age groups				
18 – 19	1.00	1.00		
20 – 29	1.40 (1.12, 1.77)	0.004	2.01 (1.57, 2.57)	< 0.001
30 – 39	1.43 (1.13, 1.80)	0.003	2.06 (1.59, 2.67)	< 0.001
40 – 49	1.25 (0.99, 1.59)	0.059	1.69 (1.30, 2.19)	< 0.001
50 – 59	1.05 (0.82, 1.33)	0.722	1.18 (0.89, 1.56)	0.238
≥ 60	1.02 (0.80, 1.29)	0.900	1.15 (0.86, 1.54)	0.347
Sex				
Female	1.00	1.00		
Male	32.59 (28.07, 37.84)	< 0.001	27.21 (22.72, 32.59)	< 0.001
Ethnicity				
Chinese	1.00	1.00		
Malay	1.77 (1.56, 2.00)	< 0.001	1.83 (1.58, 2.12)	< 0.001
Indians	0.87 (0.72, 1.07)	0.189	0.83 (0.66, 1.05)	0.119
Bumiputra Sarawak	1.68 (1.34, 2.12)	< 0.001	1.60 (1.25, 2.05)	< 0.001
Bumiputra Sabah	1.59 (1.31, 1.94)	< 0.001	1.32 (1.06, 1.64)	0.014
Highest Education Achieved				
University/ College	1.00	1.00		
Secondary	1.61 (1.40, 1.86)	< 0.001	2.22 (1.87, 2.64)	< 0.001
Primary	1.41 (1.20, 1.65)	< 0.001	2.68 (2.18, 3.30)	< 0.001
No Formal Education	0.98 (0.81, 1.19)	0.846	6.61 (4.91, 8.89)	< 0.001
Friends who smoke				
No	1.00	1.00		
Yes	17.95 (15.25, 21.13)	< 0.001	4.90 (4.03, 5.96)	< 0.001
Family who smoke				
No	1.00	1.00		
Yes	1.58 (1.44, 1.74)	< 0.001	2.20 (1.97, 2.47)	< 0.001

of smoking in Malaysia. Malay males had the highest prevalence of current smokers as compared to other ethnic groups. Similar results were also noted in 1996.[9]

The national mean initiation age of current smokers (19.2 years) did not significantly differ compared to the study done in 1996 (19.9 years). Cavelaars *et al.* also reported that females lag behind males in adopting smoking.[10] The mean initiation age for the males in our study was significantly lower compared to the females. Similar results were noted in Malaysia in 1996.[9] Peers smoking status had a significant association with the smoking status of an individual in this study. Paavola *et al.* reported that it was not easy for many adolescents to stay non-smoking if there are many smokers among their friends.[11]

Most smokers want to quit.[12] But most attempts fail and new smokers are constantly recruited.[13,14] The overall quit ratio in this study was 22.2%, which is much higher than 18.3% reported in the NHMS 1996.[9] In our study, the quit ratio for the females was 42.6% compared with 20.6% for the males. Respondents with no formal education or primary education had the highest quit ratio. A basic law of economics states that as the price of commodity rises, the quantity demanded of that product will fall. Townsend *et al.* reported that the lower income group is most affected if there is any increase in cigarette price or increase in inflation. They respond by stopping smoking, reducing the number of cigarettes smoked or change to a different brand of cigarettes that are cheaper.[15] In Canada, tax increases between 1989 and 1995 led to a steep increase in real price of cigarettes and the consumption fell substantially.[2] Similarly, higher taxes have reduced cigarette consumption in South Africa.[16] The World bank in its report 'Curbing the Epidemic: Governments and the Economics of Tobacco Control' stated that tax increases are a highly effective way to reduce tobacco consumption in low and middle income countries and that the effect of such tax increases will be more marked in these countries than in high income countries. The report also mentioned that researchers have consistently found that price increases encourage some people to stop smoking, that they prevent others from starting smoking in the first place and that they reduce the number of ex-smokers who resume the habit.[2] In Malaysia, if the government increases tax on tobacco and tobacco-related products yearly, it may lead to an increase in cigarette price and this may lead to a decrease in prevalence of smoking.

It has been reported that 50% of current smokers will die from smoking if they do not quit. Stopping smoking decreases the risk of myocardial infarction by 50% in the first year alone and cancer risk decreases to near normal within 15 years.[17] One systematic review on smoking cessation found 34 studies with results in men, 21 in women, and 6 in both sexes. It concluded that most of the increased risk is avoided by those who stop smoking before middle age, but that there is a smaller but still substantial gain among those who quit in middle or older age. However, the absolute annual risk of developing or dying from lung cancer does not decrease after stopping smoking.[18] Smoking cessation methods should not only be encouraged but also organised and supported extensively. Training for both the government and non-government health staff in Malaysia on different suitable and cost-effective methods of smoking cessation for every target group should be provided. The national strategy for smoking cessation must be target based and outcome orientated. It must also outline the category of staff to be trained and the time frame to achieve it. Tobacco control activities must be evidence based and have a built in monitoring and evaluation mechanism.

School-based prevention activity combined with intensive community level anti-smoking campaigns for adults which include an intensive mass media component can have long term positive effects.[19,20] One of the activities that can be introduced to reduce smoking amongst adolescents in Malaysia is the 'No smoking class' competitions. This could be held at both national and state level. Vartianen *et al.* reported that these 'No smoking class' competition could be used to create much publicity and help in lowering the onset of smoking. The school children can be one of the main target groups for the preventive measures.[21] The Ministry of Education should form 'Action on Smoking and

Health' (ASH) clubs in schools. These clubs can form groups to arrange activities, which highlight hazards of smoking. For those who are smoking, these clubs can arrange for counseling sessions on how to stop smoking. It is very important to select those who are good role models and have peer support to lead these clubs as they than can act as mentors.

Health professionals such as doctors, nurses, dentist, midwives, pharmacists and health inspectors have enormous potential to play a vital role in tobacco control. Helping cigarette smokers to permanently stop smoking is one of the most effective ways of preventing cancer. A physician's instruction to a patient to stop smoking and to offer assistance and advice in this endeavor is an important motivator. One premature death will have been avoided with every two smokers a clinician persuades and helps to stop smoking.[22] Given that for most smokers, relapse occurs quickly, the first follow-up contact should be two to three days, not one to two weeks, after the quit date. Many of the Malaysian doctors and healthcare workers have leadership positions at different levels. They must serve as role models and act as catalyst for action not only at the national level by getting involved in the policy-making process but also at state and district levels where they should encourage, support and ensure tobacco control activities and research. It is recommended that a comprehensive tobacco control programme be established.

A co-ordination committee chaired by the Prime Minister or the Deputy Prime Minister should be formed at the national level. The Chief Ministers of each State should play a more proactive role. The tobacco control strategy must be broad, continuous and involve all levels. At the national level, efforts must further be made not only to establish smoke-free policies and social norms but also to ensure the policies regulations and laws are enforced at the district level. The Malaysian Health Promotion Board must promote and assist tobacco users to quit and promote programs that will prevent initiation of tobacco use. There is definitely a need for a smart partnership between the government agencies involved, researchers and the community including NGOs to find solutions to the problem.

ACKNOWLEDGEMENTS

We are grateful to the Director General, Ministry of Health Malaysia and Dean, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia for permission to conduct this study. Our thanks are also due to all the State Directors of Medical and Health Services and staff for their assistance. This study which is part of the National study on Cardio-Vascular Disease Risk Factors was funded by the then Ministry of Science, Technology and Environment (MOSTE) IRPA Project Grant No. 06-02-04-0000-PR-0041/05-03.

REFERENCES

[1] Peto R, Lopez AD, Boreham J, Thun M, Heath C. Mortality from smoking in developed countries, 1950-2000. Oxford University Press, 1994.

[2] World Bank. Curbing the Epidemic. Governments and the Economic of Tobacco Control. World Bank Publication.

[3] Masironi R, Rothwell K. Trends in and effects of smoking in the world. World Health Stat Q, 1988; 41(3-4): 228-41.

[4] Surgeon General USA. The health consequences of smoking - a report of the Surgeon General, 2004.

[5] Satcher D. Health consequences of tobacco use among women. In: Surgeon General's Report: women and smoking, 2001.

[6] Janfrich D T, Thompson WD, Varfia LR, Greenwald P, Chorost S, Tuggi C, Zaman M, Melamed MR, Kiely M and McKneally MF. Lung cancer and exposure to tobacco smoke in the household. New Engl J Med 1990; 323: 632-636.

[7] Hackshaw AK, Law MR, Wald NJ. The accumulated evidence on lung cancer and environmental tobacco smoke. Br Med J 1997; 315: (7114): 980-8.

[8] Law MR, Morris JK, Wald NJ. Environmental tobacco smoke expose and ischaemic heart disease: an evaluation of the evidence. Br Med J 1997; 315: 973-80.

[9] Ministry of Health Malaysia. Report of the Second National Health and Morbidity Survey Conference Proceedings, 1997.

[10] Cavelaars AEJM, Kunst AE, Geurts JJM *et al*. Educational differences in smoking: international comparison. Br Med J 2000; 320: 1102-1107.

[11] Paavola M, Vartianen E, Puska P. Predicting adult smoking: the influence of smoking during adolescence: the influence of smoking during adolescence and smoking among friends and family. Health Education Research 1996; 11 (3): 309-315.

[12] Centers for Disease Control and Prevention. Preventing Tobacco Use, 2005. Available at: *htpp://www.cdc.gov/nccdphp/publications/factsheets/Prevention/tobacco.htm.* Accessed on: 8 July 2007.

[13] Centers for Disease Control and Prevention.Targeting Tobacco Use: The Nation's Leading Cause of Death, at a Glance 2006. Available at: *http://www.cdc.gov /nccdphp/publications/aag/osh.htm*. Accessed on: 8 July 2007.

[14] Centers for Disease Control and Prevention. Tobacco Use Among Adults - United States, 2005. Morb Mortal Weekly Rep MMWR 2006; 55(42).

[15] Townsend J, Roderick P and Cooper J. Cigarette smoking by socio-economic group, sex and age: effects of price, income and health publicity. Br Med J 1994; 309:923-927.

[16] Saloojee Y. Price and income elasticity of demand for cigarettes in South Africa. In: Slama K (Ed). Tobacco and health. New York : Plenum Press, 1995.

[17] US Dept Health and Human Services: Health Benefits of Smoking Cessation. A Report of the US Surgeon General. Rockville, MD, US. Department of Health and Human Services, 1990.

[18] Tobacco Control Reversal of Risk after Quitting Smoking. International Agency for Research on Cancer (IARC) Handbooks of cancer Prevention. 2007;11.

[19] Vartianen E, Paavola M, Puska P. Fifteen-year follow up of smoking prevention effects in the North Karelia project. Am J. Public Health 1998; 88 (1): 81-85.

[20] Perry CL, Kelder SH, Murray DM, Klepp K. Community-wide smoking prevention: long term outcomes of the Minnesota Heart Health Program and the Class of 1989 Study. Am J. Public Health 1992; 82 (1): 1210-1216.

[21] Vartianen E, Saukko A, Paavola M, Vertio H. 'No Smoking Class' competitions in Finland: their value in delaying the onset of smoking in adolescence. Health Promotion International. Oxford University Press, 1996; 11(3): 189-192.

[22] Hughes JR. New treatments for smoking cessation. CA Cancer J Clin 2000; 50: 143-151